

Neuromuscular Orthodontic Treatment in a Patient with Lateral Occlusal Discrepancy and its Influence on the Alignment of the Spinal Column

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ABSTRACT:

At the present time in Medicine and Dentistry biomedical instrumentation plays a vital role in the diagnosis and treatment of diseases. Bioelectronic instrumentation also became fundamental in orthodontics as part of that technology.

In this case report, the authors demonstrate the application of the Myomonitor, computerized mandibular scanning and surface electromyography in the diagnosis and treatment of patients with temporomandibular disorders (TMD) and lateral discrepancy in occlusion and the effect of Neuromuscular Orthodontics on the posture.¹ It will be demonstrated that a change in the temporomandibular joint in an overbite causes changes in posture and shows you how to restore muscle and postural balance. During the diagnosis and treatment the EMG spectral analysis and TENS therapy were applied.

INTRODUCTION:

There is a growing interest in the relationship between occlusion and posture because of greater

incidence of neck and trunk pain in patients with occlusal dysfunction². In dentistry, the study of the relationship between occlusal problems and the spine are of increasing interest.

This is the result of a greater incidence of pain in the muscles of the neck, trunk, the upper and lower limbs, and in the temporomandibular joints (TMJ) of patients with occlusal dysfunction¹⁶

There are several conditions that impede normal trunk alignment in the frontal plane, and it should be interesting to investigate whether such conditions also affect dental occlusion. Muller-Wacchendorff¹⁷ investigated 420 children with various postural disorders. Among the 164 children diagnosed as scoliotic, 60 (37%) were observed to have crossbites.

The study was designed to verify whether an alteration of the spinal column alignment may be experimentally induced in rats as a consequence of altering dental occlusion and also to investigate whether the spinal column underwent any further changes when normal occlusion was then restored.

The influence of the condition of the TMJ in posture was described in 1806 by Sherrington (*Figure 1*). This is confirmed in the last studies by Norman Thomas; In the descending pattern of craniomandibular dysfunction, when the noxious stimulus is applied to craniomandibular structures, the head is tilted away respectively at the atlanto-occipital and atlantoaxial joints of the upper cervical spine.

In summary, in the descending pattern arising from stomatognathic or craniomandibular nociception, there is an observed parallelism between the occlusal, pectoral, and pelvic planes with a tendency toward a double scoliosis of the cervical and thoraco-lumbar spines. Concomitant compression and subluxation of the affected vertebral, zygapophyseal, and temporomandibular joints result with attendant pain.^{19,20} It has been demonstrated that maintenance of the diameter of the oropharyngeal airway at the level of the hyoid affects muscular or portal reflexes.²¹

According to previous reports from Busquet⁴ a condition originated in a small joint produces pain referred to the body that sometimes is intense. These are the concepts crossed muscle chains. This concept can be understood as the condition of the temporomandibular joints, altered in varying degrees the rest of the body stated, as the concept of posturology from the author. At this point in dentistry and orthodontics this concept began to become relevant for obtaining a clinical history.¹

For this it is important to evaluate the etiological factors that interact as expressed by Mannheim^{5,6,7}. Malocclusion, facial asymmetry, inclination of the occlusal plane and impaired posture can be related to the condition of only one of the TMJs, but this would be the final result as the predominant role is perhaps as a bacterial or traumatic etiologic factor and affinity by a joint where malocclusion would be secondary.

But as orthodontists it is also clear that an oral inhaler (perhaps by a beta hemolytic) produces an alteration in the development of the upper jaw in pursuit of maximum intercuspation occlusion produce a torque or mandibular deviation if not treated early on alter tooth position and posture. But

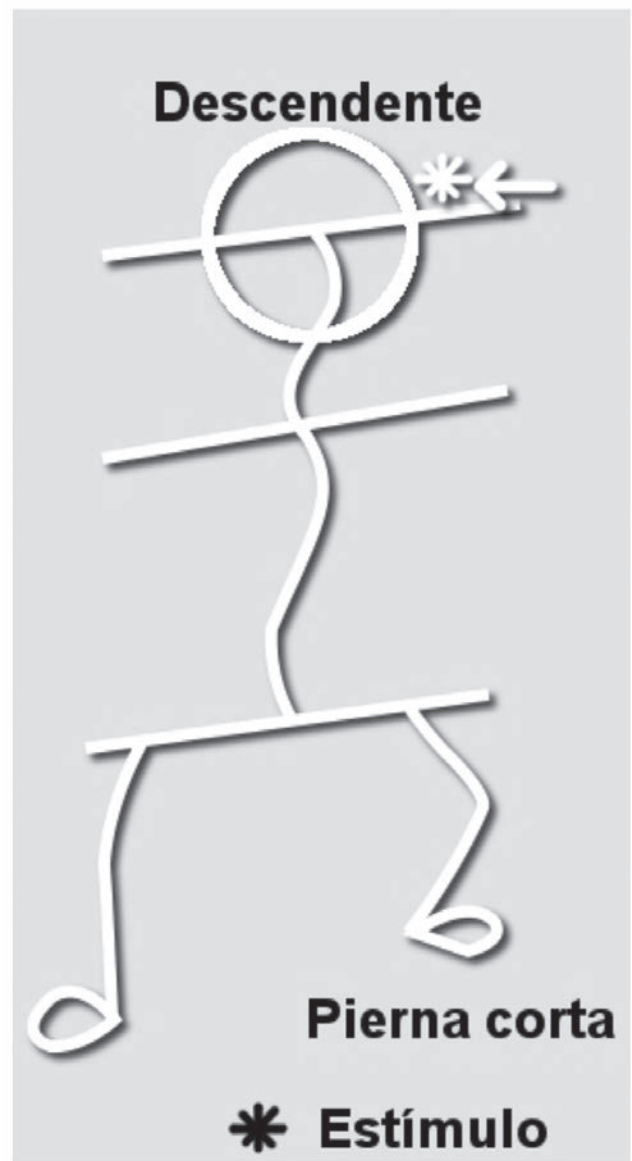


Figure 1. Sherrington Model.

the question is over the years have we performed a good diagnosis of TMJ?

The literature review of Roth R.⁸, Ricketts R⁹ and Uerki K1⁰, leads us to take extra care in the presence of malocclusions as we can see in dolico-facial patients with asymmetries, with or without crossbites, as well as in patients with systemic hypermobility. We must add those with altered praxia or vicious position, as this leads inexorably to mandibular repositioning. These conditions test the individual plasticity limit of the joint structures on each patient, according to Rocabado M.¹² and Miller A¹⁴. In these circumstances those who search for signs and symptoms of TMD



Figure 2a. Sagittal view.



Figure 2b. Frontal view.



a)



b)



c)

Figure 3. Intraoral views. a) Right view. b) Left view. c) Frontal view.



a)



b)

Figure 4. a) Lateral Tele Radiograph. b) Frontal Tele Radiograph.

are advised to take appropriate precautions that have to do with a stabilizing treatment of neuromuscular mandibular position condylar regeneration, etc. As described by Moses A1¹ Jankelson R¹³ and Learreta J1⁵⁻¹⁸.

OBJECTIVE:

The purpose of presenting this case report is to show the improvement of the position of patients once the occlusion is stabilized, eliminating the lateral deviation of jaw through the mandibular deprogramming and placing a neuromuscular orthosis applying neuromuscular principles.

Case

Symptomatic TMD patient with postural problems.

- Female: 35 years old
- Functional lateral deviations to right side, as result of narrowing in her maxilla
- *Figure 1*: Sherrington Model
- *Figure 2*: a) Sagittal view, b) Frontal view.
- *Figure 3*: Intraoral views a) Right view. b) Left view. c) Frontal view.

Chief Complaints

- Frequent headaches and cervical pain
- TMJ pain
- Ear symptoms
- The patient's objectives were the relief of pain and an improvement in her aesthetics.

History and general findings

- Postural problems
- TM clicking noises and pain to palpation in the right retrodiscal region
- Pain and tenderness to palpation in superior trapezius and temporal muscles
- **X-rays show the displacement of mandible and asymmetry caused, as well as mandibular torque**
- RMI: Displaced disc with reduction.
- *Figure 4* a) Lateral Tele Radiograph b) Frontal Tele Radiograph.
- *Figure 5* a) & b) Cephalometric radiograph.
- *Figure 6* Laminography shows mandibular torque.

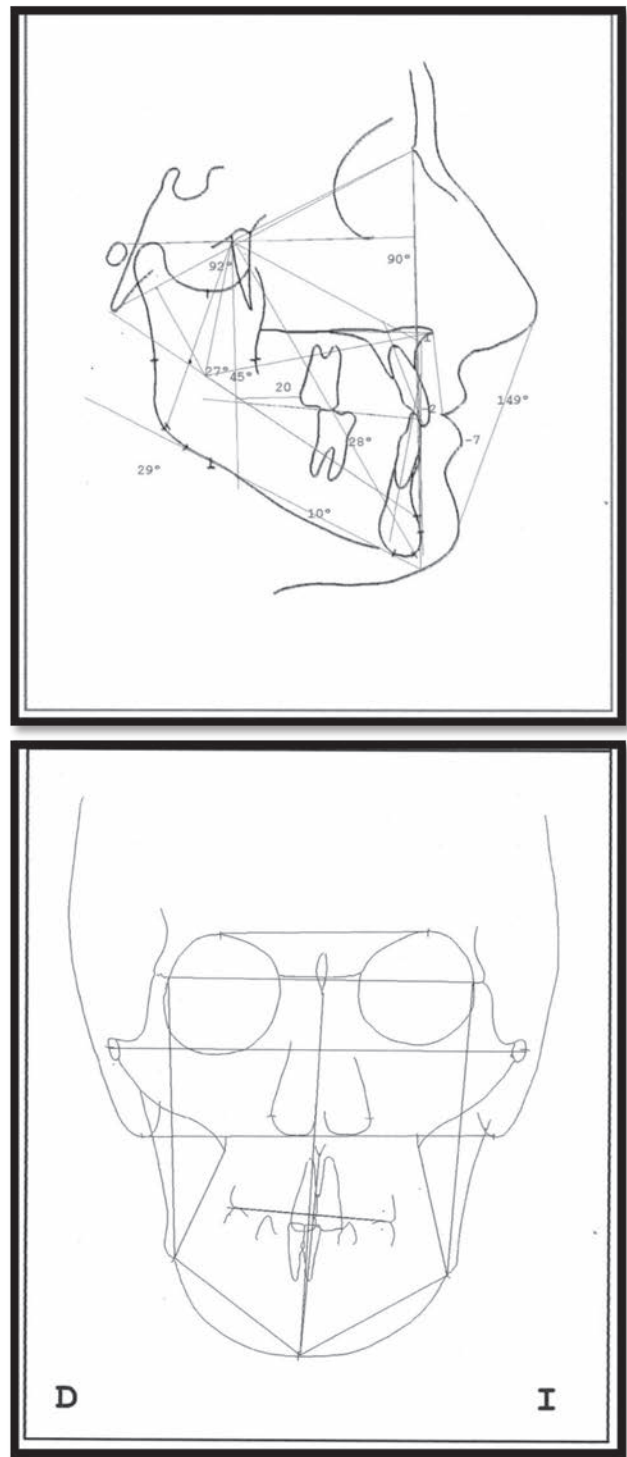


Figure 5. (a & b) Cephalometric radiograph.

- *Figure 7* a) & b) RMI; TMJ right displaced disc with reduction.
- *Figure 8* RMI a) & b) TMJ left displaced disc with reduction.
- *Figure 9* a) Posture photographs before treatment b) Espinogram frontal view.

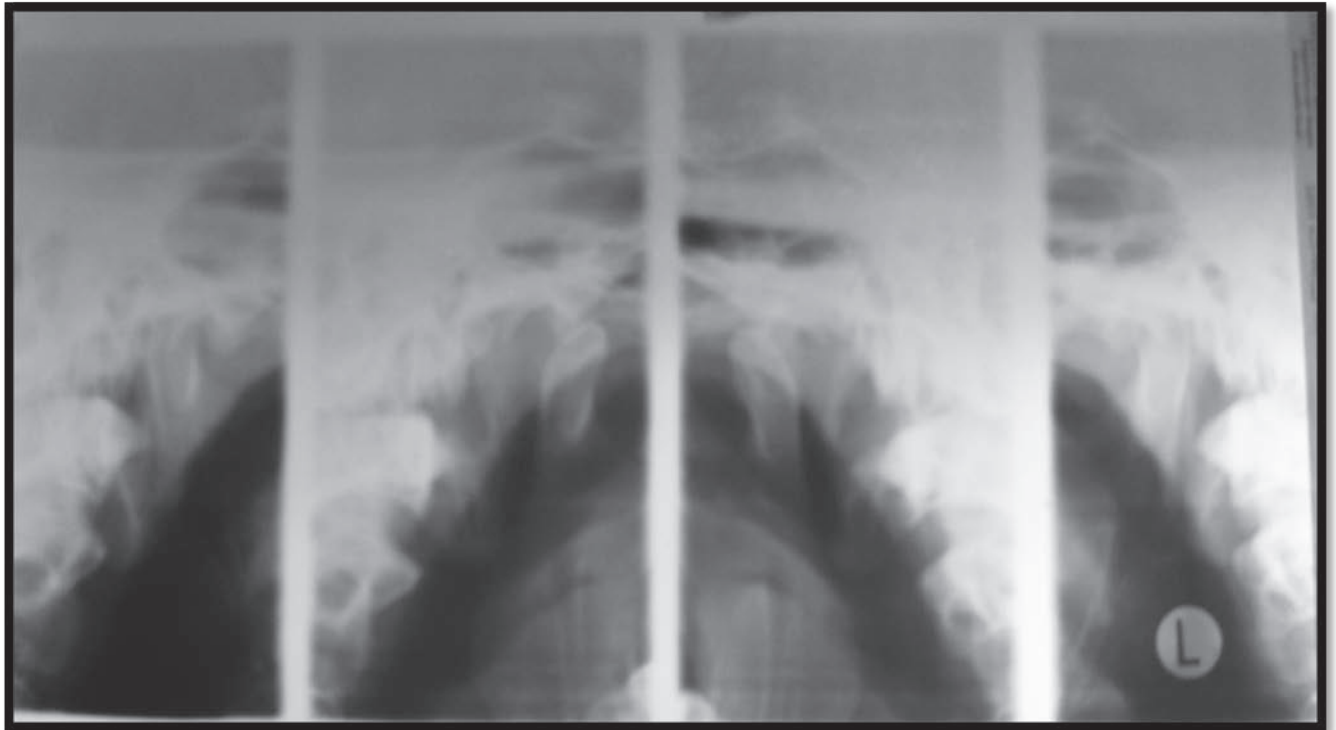


Figure 6. Laminography shows mandibular torque.

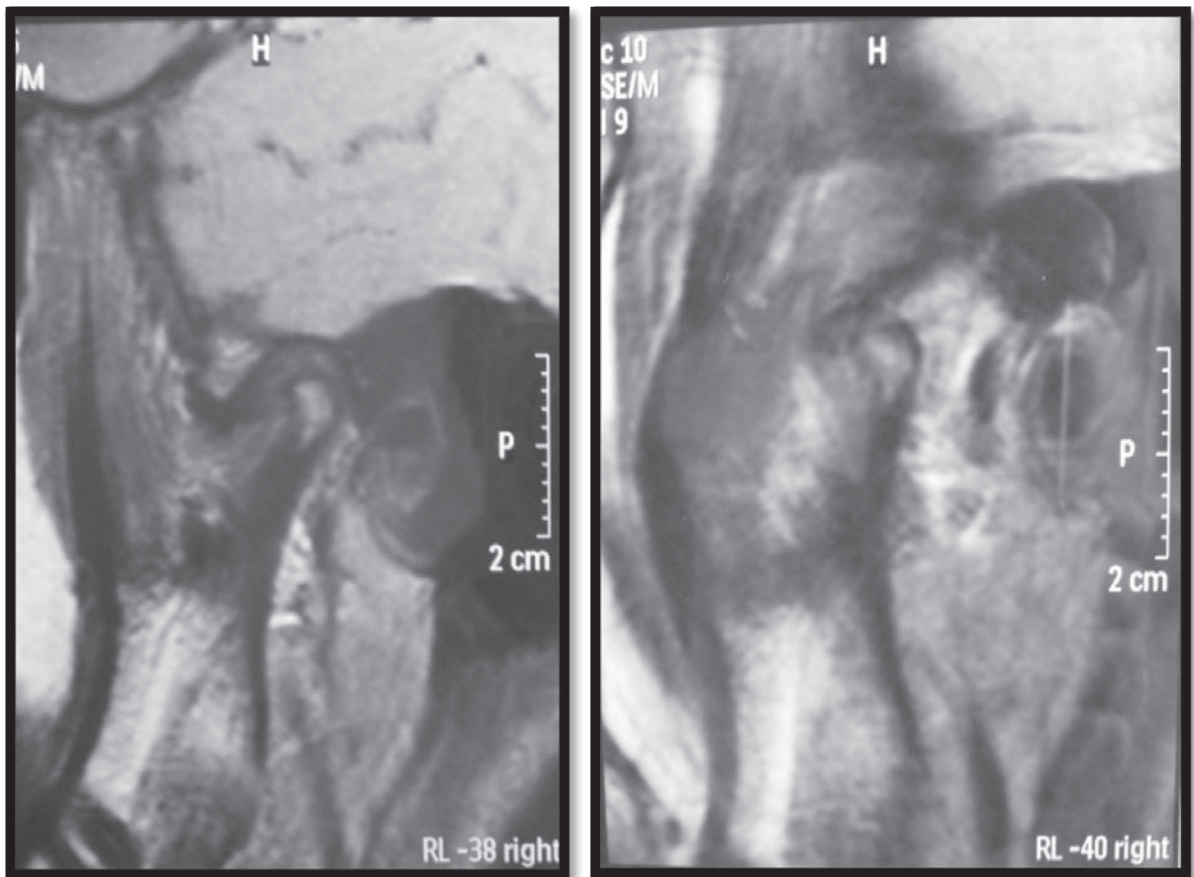


Figure 7. a) and b) MRI; TMJ right displacement disc with reduction.

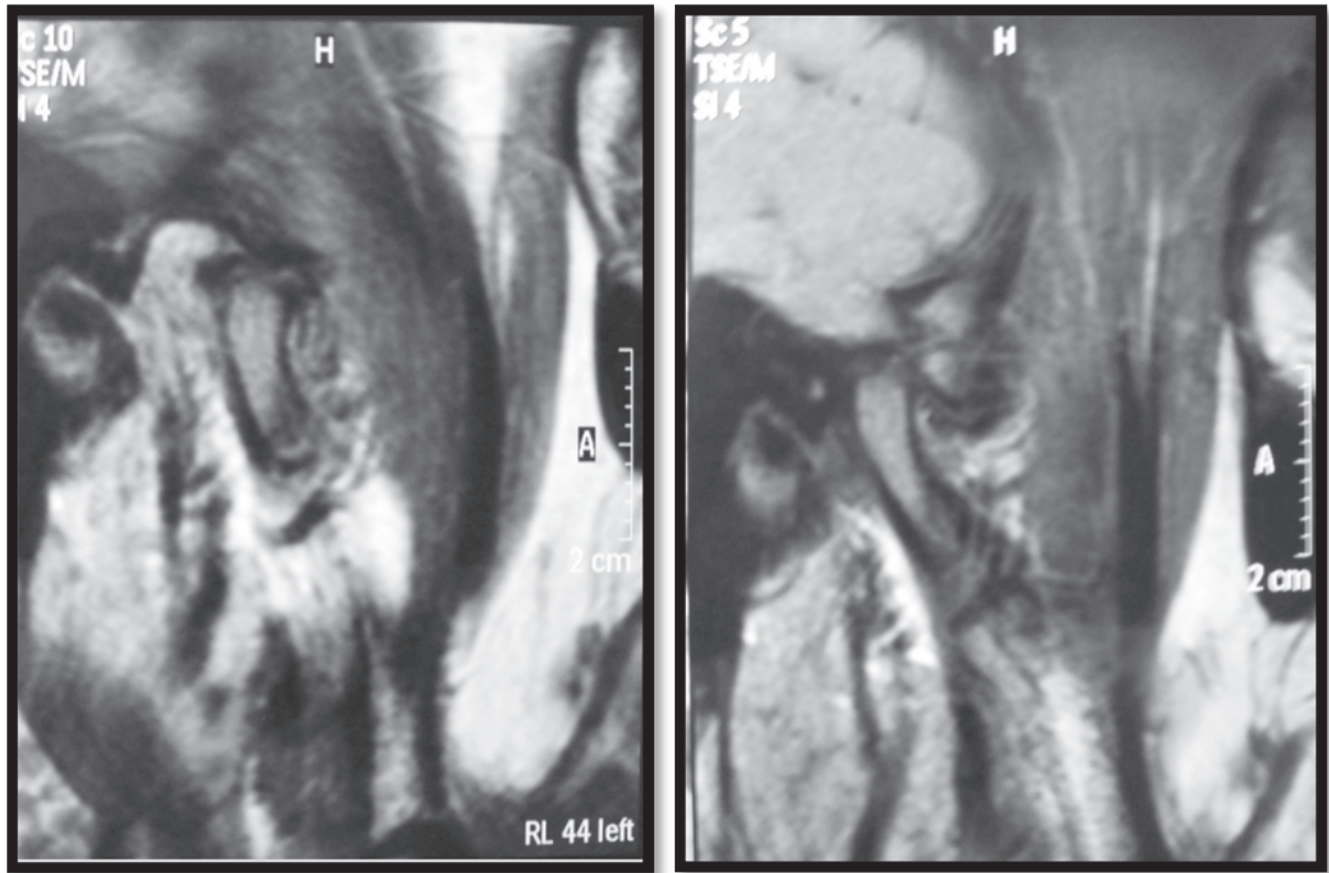


Figure 8. a) and b) MRI; TMJ left displacement disc with reduction.

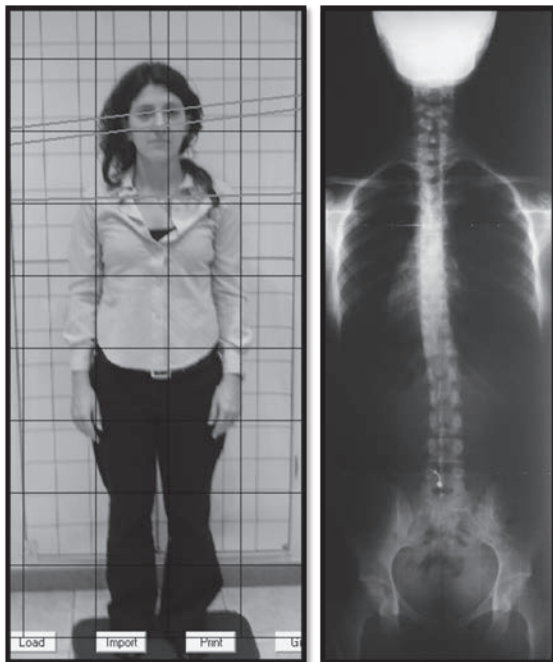


Figure 9.

- a) Posture photographs before treatment
- b) Espinogram frontal view.

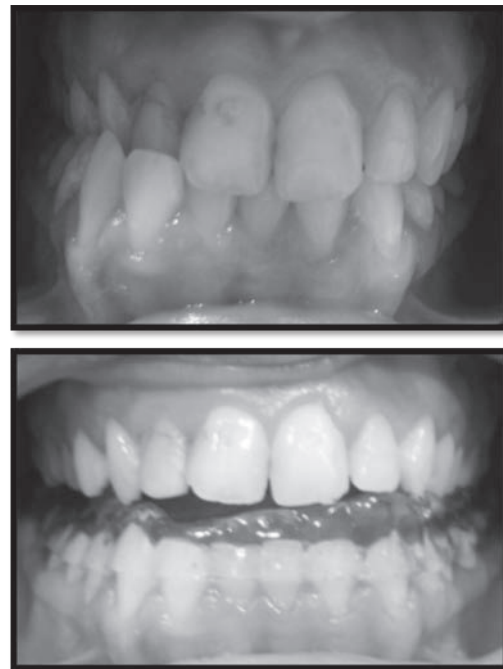


Figure 10.

- a) frontal view of the initial static occlusion.
- b) Changes in occlusion. Mandibular deprogramming with orthotic.

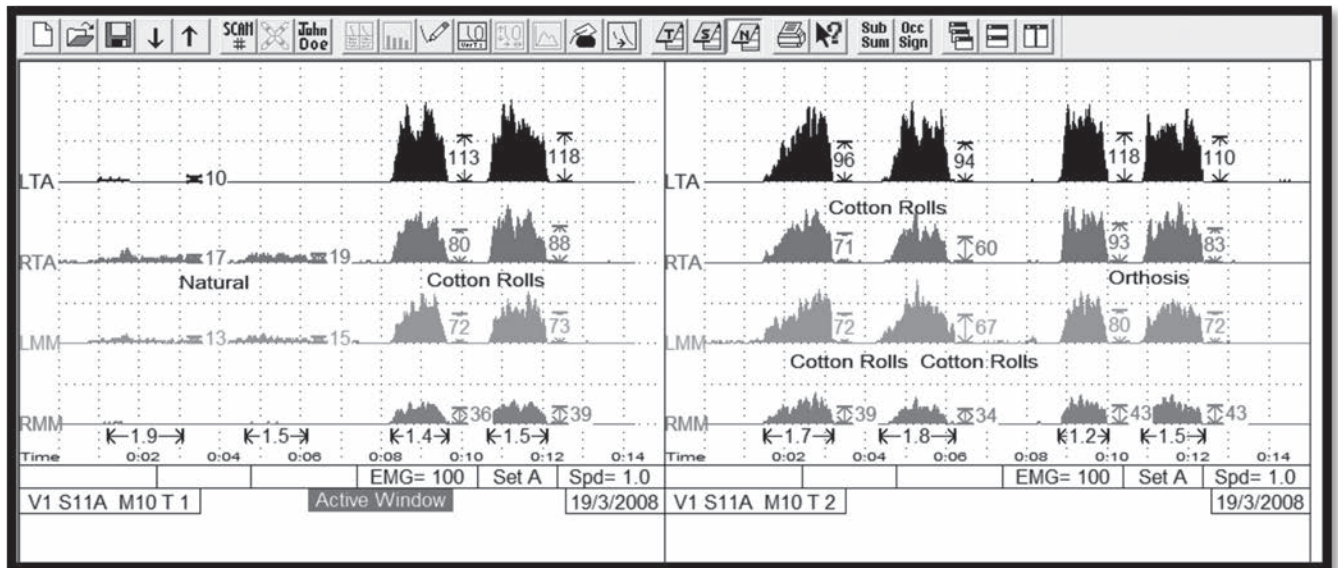


Figure 11. Scan #11. Before and after the neuromuscular position.

Objectives of treatment

1. To reestablish harmonious mandibular posture where the dentition, musculature and temporomandibular joints function synergistically and comfortably.
2. To establish proper vertical, anteroposterior and mediolateral dimensions of the dentition so as to support mandibular posture in harmony with the temporomandibular joint.
3. To retrain the musculature and avoid hyper-function, often the cause of secondary symptomatology.
4. To improve her esthetics.

Progress of treatment

The treatment is divided into two stages:

First stage

- The patient used an intraoral orthotic appliance full time for nine months.
- Figure 10 a) frontal view of the initial static occlusion. b) Changes in occlusion. Mandibular deprogramming with orthotic
- Figure 11 Scan #11. Before and after the neuromuscular position.

Objectives of orthotic use during treatment:

- Free the mandible from occlusal entrapment or deflexion
- Maintain muscle deprogramming
- Train the musculature to a new position
- Keep the temporomandibular joint properly loaded
- Do not allow orthodontic tooth movement to cause mandibular shifts
- Maintain mandibular posture during orthodontic therapy

Figure 12: Scan# 5. Checking occlusion in myo-trajectory and vertical freeway space.

Figure 13: Postural photographs. a) before treatment. b) with orthotic.

Second Stage

Orthodontic treatment

Figure 14: a), b), c), d). Neuromuscular orthodontic treatment on a new occlusal plane built from cephalometrics with orthotic. Orthotic is cut and eruption of teeth with intermaxillary elastics.

Figure 15: Completion of the case, asymptomatic patient.

Figure 16: a), b). Scan #9. Before and after.

Figure 17: Scan #18 before and after.

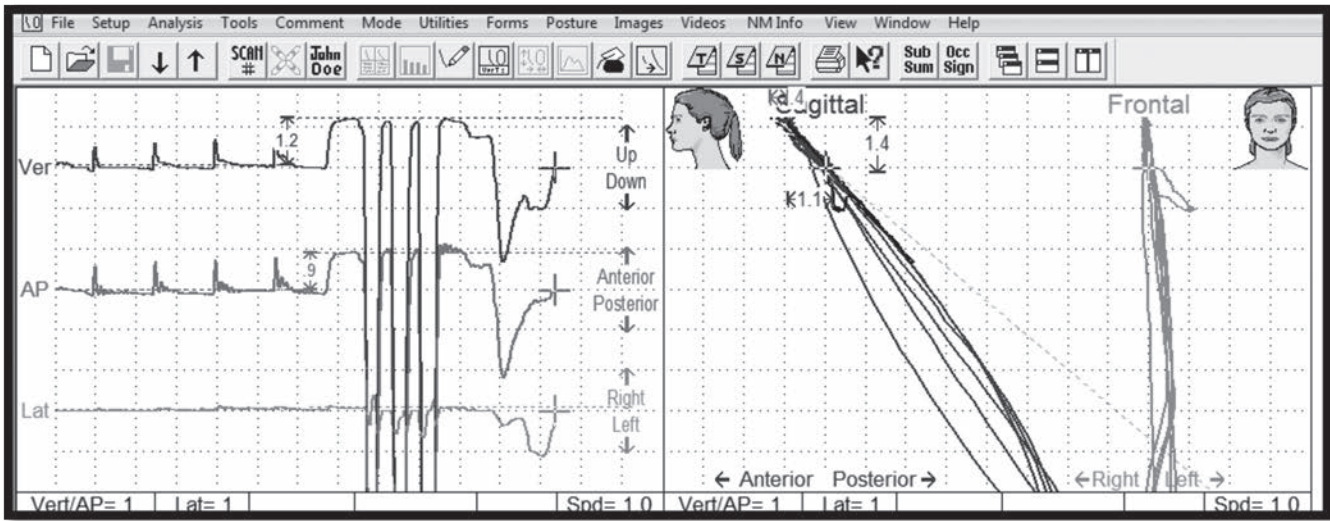


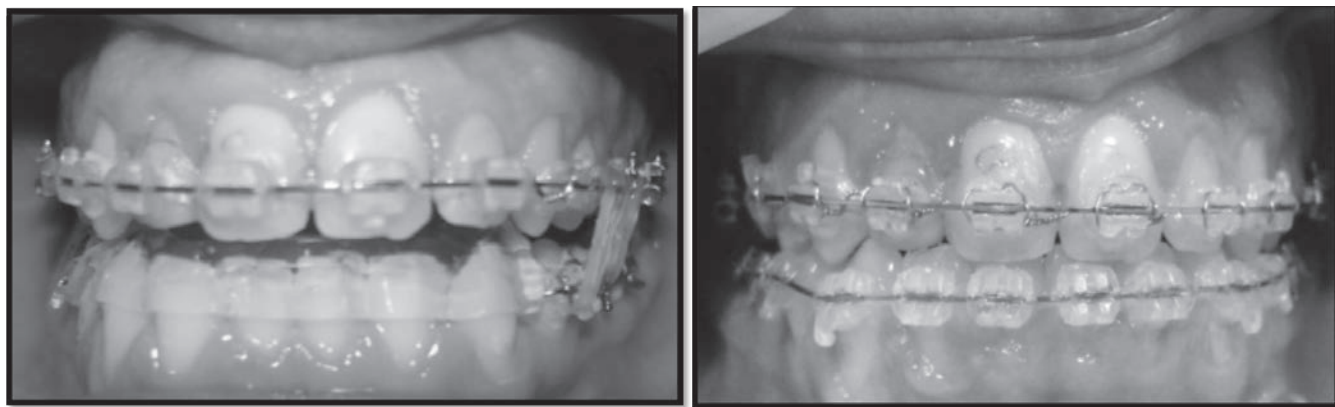
Figure 12. Scan# 5. Checking occlusion in myo-trajectory and vertical freeway space.



a) Before treatment.

b) With orthotic.

Figure 13. Posture photographs.



a)

b)

Figure 14. a) b).Neuromuscular orthodontic treatment on a new occlusal plane built from cephalometrics with orthotic. Orthotic cut and eruption with intermaxillary elastics.



a)



b)



c)



d)

Figure 15. a), b), c), d). Completion of the case, asymptomatic patient.

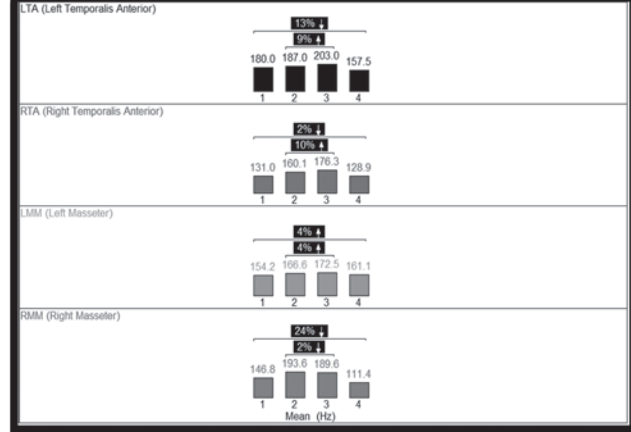
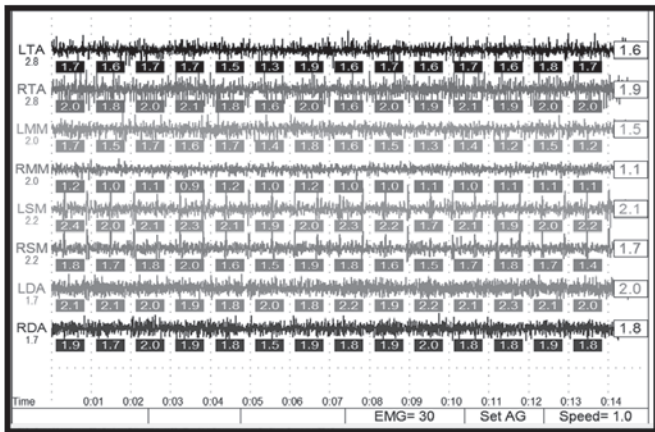
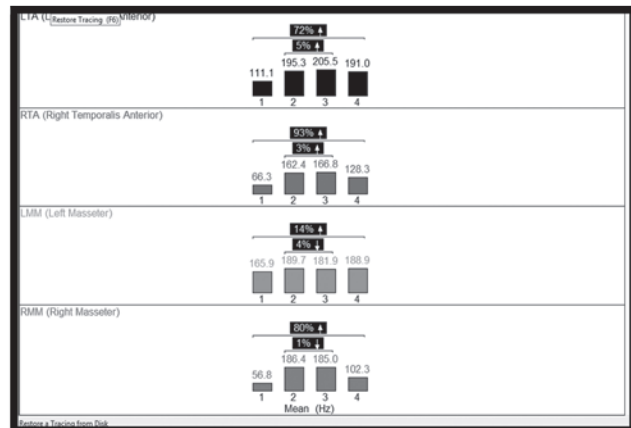
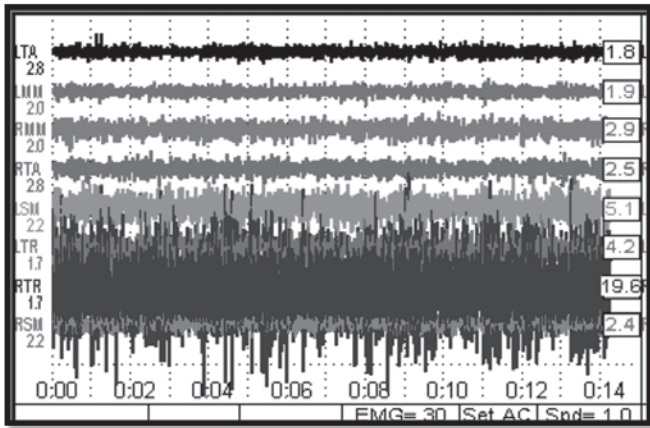


Figure 16. a). b). Scan #9. Before and after treatment.

Figure 17. a). b). Scan #18. Before and after treatment.

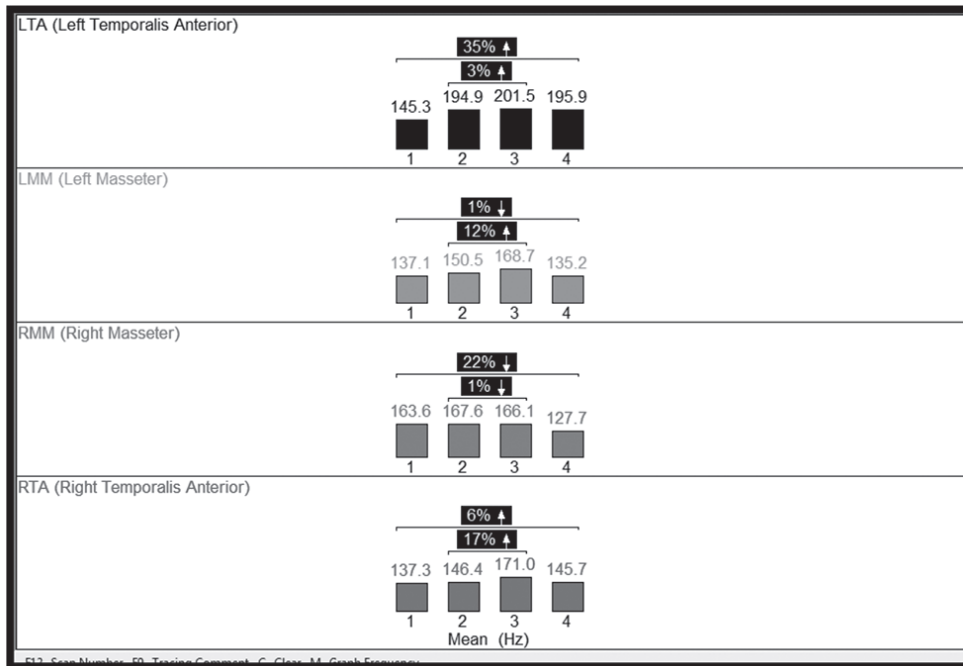


Figure 18. Fatigue check two months later.

Figure 18: Fatigue control two months later.

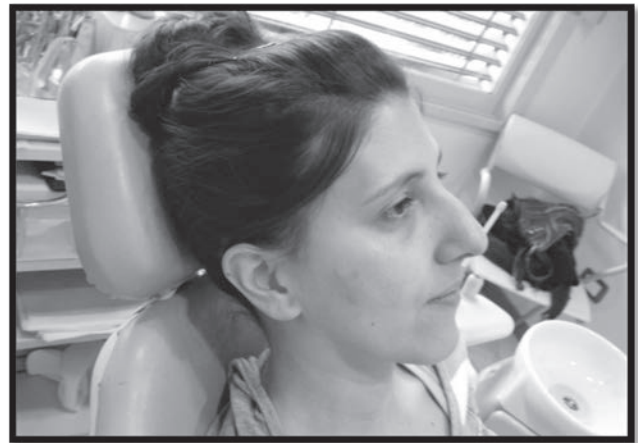
Figure 19: a). b). c). d). Re-evaluation seven years later.

CONCLUSIONS:

The temporomandibular joint has a very important place in the medical history of our patient. Mannheim⁶ noted that it is very important to evaluate the interacting etiological factors. It is common to find temporomandibular joint dysfunction related to problems of malocclusion, facial asymmetries, occlusal plane inclination and posture disorders in cases in which only one of the joints it is affected. But the occlusal pathology would be a secondary fact, since the leading role would be in bacterial or traumatic pathology of TMJs and their affinity for one of the joints. That is to say that the origin is the dysfunction, the disorder or pathology of the temporomandibular joint and the consequences are the occlusal, muscular and postural changes.

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a)



b)



c)



d)

Figure 19. a). b). c). d). Check seven years later.

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